

REMARKS

Claims 1-53 are pending in the application, of which Claims 1, 11, 13, 32, 33, 41, 46, 50, 51, 52, and 53 are independent. All claims were rejected. Claims 1, 11, 13, 32, 33, 41, 46, 50, 51, 52 and 53 are amended by the present amendment. Claims 54-67 are added by the present amendment to claim the invention more distinctly.

Rejections of Claims 11, 12 and 23-31 under 35 U.S.C. § 112, second paragraph

Claims 11, 12 and 23-31 were rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness because there was insufficient antecedent basis for "the repository". In response, Claim 11 is amended to provide sufficient antecedent basis. In particular, Claim 11 is amended to recite the "shared" repository, and, therefore, the rejection of Claim 11, and its dependent Claims 12, and 23-31 under 35 U.S.C. 112, second paragraph, should be withdrawn. Reconsideration and acceptance are respectfully requested.

Rejections of Claims 1-53 under 35 U.S.C. § 103(a)

Claims 1, 7-9, 11-13, 19-21, 29-33, 39-41, 45-47, 50 and 53 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Alfieri et al. (U.S. Patent No. 5,666,486) in view of Lennie et al. (U.S. Patent No. 6,092,213).

Independent Claims 1, 11, 13, 32, 33, 41, 46, 50, 51, 52, and 53 relate to a technique for maintaining a cluster definition for a network cluster. The network cluster has at least one member node coupled to a shared repository. A cluster definition for the network cluster is stored in the shared repository. A member node accesses the cluster definition in the shared repository regardless of network connectivity. A member node proposes changes to the cluster definition by sending the changes to the shared repository. A coordinator node is selected from a member node to update the cluster definition to reflect the proposed change.

With the claimed invention, even though network connectivity may have been lost in the cluster, the nodes can still access the cluster definition at the shared repository and propose updates to the cluster definition at shared repository. Thus, the invention creates a network cluster that does not need to rely on network connectivity, but rather uses a shared repository to store a single shared copy of the cluster definition.

By way of contrast, Alfieri discusses a cluster management system that relies on network connectivity. Alfieri specifically states that when a node cannot communicate due to an interconnect failure on node, that node is forced to leave the cluster.¹ With the present system, however, a node does not need interconnectivity because a node can still access the cluster definition and the node can propose changes to the cluster definition if it has access to the shared repository.

In Alfieri, each node has cluster management software that notifies other nodes of membership changes through the system area network. Alfieri's cluster management software enables nodes that have different layers of subsystems to register all subsystems with a membership manager to receive notices of cluster membership changes, and to distribute those changes to the subsystems according to a distribution hierarchy. In particular, Alfieri discusses that changes are distributed to a member, and the member notifies its subsystems according to a top-down or bottom-up fashion. For example, when a cluster transition occurs, all nodes' subsystems with the "highest order" are notified of the changes, and once it is confirmed that the "highest order" of nodes are notified, the "lower level subsystems" are notified of the changes to the cluster definition. Thus, Alfieri requires network connectivity for member nodes to access

¹ Alfieri, col. 7, ll. 56- col. 7, ll. 2 "An example of a forced leave is illustrated with respect to FIGS. 13-15 which begins with node N1 being joined to the cluster . . . If, by way of example, the membership managers of nodes N0 and N1 . . . have not received an acknowledge from the SFS subsystems 52 of their completion of node N0's graceful join processing because the SFS subsystems of nodes N0 and N1 cannot communicate due to an interconnect failure on node N0, node N0's graceful join is noted as in a hung state (FIG. 13). The membership manager of node N1 notices that node N1 can no longer communicate with node N0. Node N1 forces node N0 out of the cluster by marking node N0's state as forced-leaving. . . ."

the current cluster definition, while Applicants' amended Claims 1, 11, 13, 32, 33, 41, 46, 50, 51, 52, and 53 enable a member node to access the cluster definition on the shared repository, regardless of network connectivity.

Although Alfieri discusses that a joining node can access a membership database in a shared disk to retrieve its configuration information,² the membership database is neither used by members to access the cluster definition, nor used by members to propose changes to the cluster definition. Rather, Alfieri's membership database is only used by joining nodes and the cluster master node.

As such, it is respectfully submitted that Alfieri does not discuss the requirements of the invention. For example, Claim 1, requires the following limitations that are not discussed in Alfieri:

accessing, by a potential member node, the cluster definition on the shared repository, regardless of network connectivity;
at a member node, requesting a change to the cluster definition by sending a proposed change to the shared repository; and
in response to the proposed change request, updating, from the coordinator node, the cluster definition stored in the shared repository to reflect the requested change; and
accessing, by a member node, the updated cluster definition on the shared repository.

Therefore, it is respectfully requested that the rejections of Claim 1 based on Alfieri be withdrawn.

The Examiner correctly notes that Alfieri does not discuss the claimed *updating, by the*

²Alfieri, col. 6, ll. 23-54.

coordinator node, the cluster definition stored in the shared repository to reflect the requested change. The Examiner cites Lennie to show this limitation. Lennie discusses an approach for maintaining and distributing a cluster configuration to nodes of the cluster, which relies on network connectivity. According to Lennie, a request to change the cluster configuration is received by a primary process running on one of the nodes. The primary process stores the configuration changes on a database registry and communicates the configuration changes to each node. When a node receives the configuration changes from the primary process via the network, a monitor process running on the node stores the configuration changes in a database registry associated with the node. Thus, like Alfieri, Lennie is dependent on connectivity between the nodes to distribute the current cluster definition, and therefore, Lennie does not discuss the requirements of the Claims 1, 11, 13, 32, 33, 41, 46, 50, 51, 52, and 53.

Because none of the references cited by the Examiner discuss this inventive concept of *accessing the cluster definition on the shared repository, regardless of the network connectivity*, the rejection of Claim 1 under § 103(a) should be withdrawn. Independent Claims 11, 13, 32, 33, 41, 46, 50, 51, 52, 53, 54, 62 and 67 also require *accessing the cluster definition on the shared repository, regardless of the network connectivity*, and therefore, the rejections of Claims 11, 13, 32, 33, 41, 46, 50, 51, 52, 53, 54, 62 and 67 under § 103(a) should also be withdrawn.

Claims 6, 18, 38, 44, 48 and 52 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Alfieri-Lennie and Slaughter et. al as applied to claims 5, 17, 37, 43, 47 and in further view of Bamford et al. (U.S. Patent No. 6,243,702).

Slaughter discusses a virtual disk system that allows nodes to have access to physical resources (such as nodes and storage devices). Similar to Lennie and Alfieri, Slaughter discusses a cluster membership monitor that detects and conveys membership changes using the network to other nodes, such as a new node joining the cluster. Thus, Slaughter requires network connectivity, and therefore, does not discuss the limitations of claimed invention.

Bramford discusses a technique for managing transactions in a system of database servers that have access to a common database. Bramford does not relate to a technique for maintaining a cluster membership definitions for a network cluster, and therefore, is nonanalogous art. As such, any rejections based on Bramford should be withdrawn.

Thus, the rejections of Claims 1, 11, 13, 32, 33, 41, 46, 50, 51, 52, 53, 54, 62 and 67 based on Alfieri, Lennie, Slaughter and Bramford should be withdrawn. Reconsideration and acceptance are respectfully requested.

Claim 51 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Alfieri in view of Slaughter in further view of Lennie.

Claim 51 includes similar limitations to Claim 1, and therefore, is allowable for the reasons set forth above. It is noted that Claim 51 also requires that each member node have a scratch area on the shared repository where the node sends its proposed changes to the cluster definition. Member nodes can access the cluster definition and propose changes to the definition using the same shared repository. In this way, the shared repository provides a disk based messaging environment that enables nodes to communicate cluster membership changes using through a message location (e.g. scratch space) on the shared repository.

Alfieri, Lennie, Slaughter and Bramford, taken alone or in combination, does not discuss the claimed scratch space on the shared repository as required by Claim 51. Therefore, the rejection of Claim 51 should be withdrawn.

Claims 2, 3, 10, 14, 15, 22, 23, 34-36 and 41 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Alfieri-Lennie and in further view of Slaughter et al. (U.S. Patent No. 6, 014,669). Claims 4 and 16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Alfieri-Lennie and Slaughter et. al and in further view of Arendt et al. (U.S. Patent No. 6,

003,075). Claims 5, 17, 27, 37, 43 and 47 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Alfieri-Lennie and in further view of Slaughter et. al (U.S. Patent No. 5,964,886).

Dependent Claims 2-10, 12, 14-31, 34-40, 42-45, 47-49, 55-61 and 63-66 incorporate all limitations from the corresponding base claim. Because the base claims are in condition for allowance, the dependent claims should also be allowed.

For the reasons described above, all claims are in condition for allowance. Reconsideration of the rejections under § 103(a) is respectfully requested.

New Claims

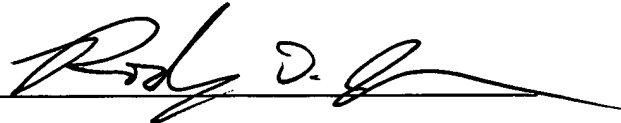
New Claims 54-67 are being added to the application to more distinctly claim the Applicants' claimed invention. Support for the new Claims 54-67 can be found in the application, as originally filed, for example, at pg. 13. No new matter is being introduced. Acceptance and allowance are respectfully requested.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By 

Rodney D. Johnson
Registration No. 36,558
Telephone: (978) 341-0036
Facsimile: (978) 341-0136

Concord, MA 01742-9133

Dated: *July 6, 2004*